

REMARKS

The pending Office Action addresses and rejects claims 1-20. Applicants respectfully request reconsideration in view of the following remarks.

Response to Examiner's Comments

At the outset, in the present Office Action the Examiner asserts that “[t]he current specification fails to teach or suggest that the pH value must be adjusted to obtain the claimed gamma value,” and moreover that “the specification falls well short of teaching that this adjusting step is necessary.” Applicants respectfully disagree.

The specification makes it clear that the claimed gamma value, as well as the surface area and apparent density, are obtained as a direct result of adjusting the pH from an acidic pH to a neutral pH during formation of the filter media. In particular, paragraph 0019 of the specification explains that:

it has been discovered that adjusting the pH during wet laid processing will produce a glass fiber web having improved filtration properties. In particular, neutralizing the pH of a slurry containing mainly glass wool fibers unexpectedly yields a non-electret, glass filter media that has a gamma value of at least about 14, which is a significant improvement over non-electret, glass filter media currently on the market which have been shown to have a gamma value that does not exceed 13. Moreover, the adjusted pH unexpectedly produces a filter media having an improved surface area, which is preferably at least about 1.2 m²/g, and an improved apparent density, which is preferably at least about 0.15 g/cc.

The specification further explains that:

Since glass wool fibers are anionic by nature, an acidic agent can be added to the slurry to form a slurry having a pH in the range of about 2 to 4, and most preferably about 3.

...

Once the slurry is prepared and the pH is adjusted to about 3, a neutral or alkaline pH adjusting agent is added to the slurry to adjust the pH to a pH in the range of about 6 to 12, and more preferably in

the range of about 7 to 10. It has been discovered that this additional step of adding a neutral or alkaline pH adjusting agent to the slurry unexpectedly produces a nonwoven glass web having improved filtration properties

(Specification, paragraphs 0023 and 0024).

Example 1 further illustrates the effects of adjusting the pH during formation of the filter media. As explained in paragraph 0034, a slurry was prepared containing a mixture of glass fibers, and the pH of the slurry was adjusted to a range of about 2.3 to 3.8. Three samples of fiber web were collected at a pH of 2.3, 3.6, and 3.8. The experiment was repeated containing the same fiber mixture, however the pH was adjusted to a range of between 4.3 and 10.3. Samples were collected at pH's ranging from 4.2 up to 10.4. The results are set forth in Table 1 of the specification. As shown, the samples collected at an acidic pH (i.e., samples 2.3, 3.6, 3.8, and 4.2) that was *not adjusted* have a gamma value of about 13. Conversely, the samples collected at a neutral pH (i.e., 6.7, 7.0, 8.0, 8.4, 9.2, 9.6, and 10.4) that was adjusted from an initial acidic pH have a gamma value that is 14 or greater. Thus, adjusting the pH of the slurry from an acidic pH to a neutral pH clearly improves the gamma value of the resulting filter media. Table 1 also shows a significant improvement in the apparent density and the surface area of the filter media as a direct result of adjusting the pH of the slurry.

Accordingly, the specification clearly shows that the claimed gamma value, surface area, and apparent density are a direct result of adjusting the pH of a slurry from an acidic pH to a neutral pH. Thus, in order for the cited references to inherently teach the claimed gamma value, surface area, and apparent density, the references must teach a filter media that is formed from a slurry of glass wool fibers having a pH that is adjusted from an acidic pH to a neutral pH.

Claim Rejections Pursuant to 35 U.S.C. §103

I. Independent Claim 1

Independent claim 1 recites a nonwoven filter media having at least one glass wool fiber having a gamma value of at least about 14, and a surface area of at least about 1.2 m²/g.

(1) Pierce, Dong, and Perez

The Examiner rejects independent claim 1, as well as claims 2-7 which depend therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over WO 01/43850 of Pierce in view of U.S. Patent No. 6,291,552 to Dong, and further in view of U.S. Patent No. 6,420,024 of Perez et al. The Examiner relies on Pierce to disclose the claimed glass wool fibers; Dong to disclose adding oppositely charged viscosity modifiers to the glass fibers resulting in a pH in the range of about 5 to about 10, thereby obtaining a filter media that *inherently* has the claimed gamma value; and Perez to disclose the claimed surface area.

In Applicant's previous response, Applicant explained that Dong does not teach adjusting the pH of a slurry from an acidic pH to a neutral pH during the wet-laid process. In response, the Examiner argues that Dong discloses a pH of a slurry ranging from about 5 to about 10, and that Applicant's specification does not teach or suggest that the pH must be *adjusted* to obtain the claimed gamma value. Applicant agrees that Dong discloses the use of a slurry ranging from about 5 to about 10. However, the fact that the slurry has a pH between 5 and 10 does not mean that the pH is *adjusted*. As explained above, Applicant's specification makes it clear that the claimed Gamma value is obtained by forming a slurry having an acidic pH, and then *adjusting* the pH to a neutral or alkaline pH. Since Dong fails to teach or even suggest adjusting the pH, Dong fails to remedy the deficiencies of Pierce, and thus the combination of references does not teach a filter media that inherently has the claimed gamma value.

In Applicant's previous response, Applicant also argued that Dong is non-analogous art. In response, the Examiner asserts that Dong is in the field of applicant's endeavor which is wet laid methods of making glass fiber mats. Applicant continues to disagree. Applicant's endeavor is to provide a filter media having improved *filtration properties*, not to wet laid methods of making glass fiber mates. This is repeatedly set forth in the specification. Dong does not endeavor to provide any type of filter media, much less one that has improved filtration properties. To the contrary, as asserted by the Examiner, Dong is directed to methods for making glass fiber mats. The mats are specifically configured for use as roofing shingles, composite articles, polyurethane foam headliners, and reinforced plastics. There is no teaching or suggestion in Dong to use the fiber mats as filters. Dong is therefrom not within the field of Applicant's endeavor. Dong is also not reasonably

pertinent to the problem being solved for similar reasons. Applicant set out to provide a filter media having improved filtration properties, such as a high gamma value, a high surface area, and a high apparent density. Dong is not pertinent to any of these problems, as Dong does not relate to the use of any type of filter media. No person having ordinary skill in the art of making filter media would rely on a reference directed to a fiber mat used for roofing shingles, composite articles, etc. to solve the problem of improving the filtration properties of a glass fiber web. Dong is therefore non-analogous art and cannot be relied on to formulate an obviousness rejection.

The Examiner further relies on Perez to teach the claimed surface area. As explained in Applicant's previous response, surface area cannot merely be "set" to a specific value as desired. It has to be obtained. A person having ordinary skill in the art cannot merely rely on Perez to teach a certain surface area, and then merely decide to produce a filter media having that surface area. To the contrary, they would have to modify the process and/or materials based on the teachings of Perez to form a filter media having the desired surface area. The Examiner has failed to explain how Pierce would be modified in view of Perez to arrive at the claimed surface area, and has failed to provide any motivation for doing so. Perez is directed to charged, high-strength, high-modulus, melt-processed microfibers having a microfibrillated surface. This is achieved by using microfibrillated polymeric fibers having a rectangular cross-sectional shape. In order to modify Pierce to produce a filter media having the claimed surface area, one would have to not only replace the glass fibers of Pierce with the polymeric fibers of Perez, but would also have to essentially replace the method of Pierce with the method taught by Perez. In other words, the teachings of Pierce would have to be entirely ignored, and one would have to simply make the filter media taught by Perez. Perez, however, does not disclose the use of glass wool fibers, much less a filter media having the claimed gamma value. Accordingly, Perez does not remedy the deficiencies of Pierce and Dong.

Independent claim 1, as well as claims 2-7 which depend therefrom, therefore distinguish over Pierce, Dong, and Perez and represent allowable subject matter.

(2) Pierce, Pall, and Perez

The Examiner also rejects claims 1-7 pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of U.S. Patent No. 4,523,995 to Pall, and further in view of Perez. The Examiner

relies on Pierce to disclose the claimed glass wool fibers; Pall to disclose varying the pH of a nonwoven glass fiber to a pH of about 7 to 10, thereby obtaining a filter media that *inherently* has the claimed gamma value; and Perez to disclose the claimed surface area.

As explained in Applicant's previous response, Pall is directed to a filter media that is formed by adding a binder to a fiber slurry, and adding a precipitating agent to the slurry to precipitate the binder and thereby coat the fibers in the slurry. The pH of the slurry is adjusted to increase the precipitation efficiency of the binder. Pierce, on the other hand, adds a binder to a mat *after* the fiber mat is formed, and thus there is no reason to adjust the pH of the slurry.

In the present Office Action, the Examiner argues that it would have been obvious to modify Pierce to add the binder to the slurry *before* forming a filter media, as taught by Pall, and therefore it would have been obvious to vary the pH of the slurry to form a filter media with excellent strength and particulate removal efficiency. Such a modification is improper as it would require the teachings of Pierce to be ignored. Pierce and Pall are directed to entirely distinct processes to produce entirely distinct filter media. Pall's goal is to provide a filter media that can be electrostatically charged. This is achieved by coating the fibers with a binder prior to formation of the filter media. Pierce is directed to providing a boron-free filter media, and does not use an electrostatically charged filter media. Thus, there is no need to coat the fibers of Pierce with a binder prior to forming the slurry. Pierce specifically teaches adding a binder to filter media *after* the filter media is formed, and no person having ordinary skill in the art would ignore the teachings of Pierce and modify Pierce to add the binder to the slurry, as taught by Pall.

With regard to Perez, as previously explained above a person having ordinary skill in the art cannot merely rely on Perez to teach a certain surface area, and then merely decide to produce a filter media having that surface area. In order to modify Pierce to produce a filter media having the claimed surface area, one would have to not only replace the glass fibers of Pierce with the polymeric fibers of Perez, but would also have to essentially replace the method of Pierce with the method taught by Perez. In other words, the teachings of Pierce would have to be entirely ignored, and one would have to simply make the filter media taught by Perez. Such a modification is improper.

Independent claim 1, as well as claims 2-7 which depend therefrom, therefore distinguish

over Pierce, Pall, and Perez and represent allowable subject matter.

II. Independent Claim 8

Independent claim 8 recites a nonwoven filter media comprising at least one glass wool fiber having a gamma value of at least about 14, and an apparent density of at least about 0.15 g/cc.

(1) Pierce, Dong, and Perez

The Examiner rejects independent claim 8, as well as claims 9-12 which depend therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong, and further in view of Perez. As noted above with respect to claim 1, the Examiner relies on Pierce to disclose the claimed glass wool fibers; Dong to disclose adding oppositely charged viscosity modifiers to the glass fibers resulting in a pH in the range of about 5 to about 10, thereby obtaining a filter media that *inherently* has the claimed gamma value; and Perez to disclose the claimed surface area.

At the outset, the basis for this rejection is unclear. Independent claim 8 does not include a limitation relating to the surface area of the filter media, and thus the Examiner's reliance on Perez is unclear. Rather, independent claim 8 requires that the filter media have an apparent density of at least about 0.15 g/cc. The Examiner does assert, however, that "considering that the nonwoven filter media taught by the applied art possess an identical surface area and is made with an identical wet laid process producing a substantially uniform web, it appears that the apparent density of the web is inherently at least about 0.15 g/cc." Thus, it appears that the Examiner is relying on Perez to modify the surface area of Pierce to produce a filter media as disclosed in the present application, and thus to conclude that the filter media will inherently have the claimed apparent density. If Applicant's assumption with regard to this rejection is incorrect, clarification and/or reconsideration of this rejection is respectfully requested.

First, claim 8 distinguishes over Pierce and Dong for the same reasons previously discussed with respect to claim 1. Neither Pierce nor Dong teach or even suggest a filter media that inherently has the claimed gamma value. Dong is also non-analogous art that cannot be relied on. Perez does not remedy the deficiencies of Pierce and Dong, as Perez likewise fails to teach a filter media formed by modifying a pH of a slurry from a neutral pH to an alkaline pH.

Second, Pierce, Dong, and Perez also fail to teach a filter media having the claimed apparent density. As set forth in Applicant's specification, the apparent density is obtained due to the adjusted pH of the slurry, and since Pierce, Dong, and Perez do not teach such a technique they likewise do not teach the claimed apparent density. The Examiner's rejection is also flawed because a filter media having the same surface area as disclosed in applicant's specification will not necessarily have the same apparent density.

Claim 8, as well as claims 9-12 which depend therefrom, therefore distinguish over Pierce, Dong, and Perez and represent allowable subject matter.

(2) Pierce, Dong, Perez, and Head

The Examiner also rejects independent claim 8, as well as claims 9-12 which depend therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over Pierce, Dong, Perez, and further in view of U.S. Patent No. 4,102,785 to Head et al.

At the outset, the Examiner's reasons for this rejection are unclear. As noted above, claim 13 is rejected as being obvious over Pierce, Dong, and Perez. Now the Examiner further relies on Head to render claim 13 obvious. It is thus unclear whether the Examiner believes that Pierce, Dong, and Perez teach the filter media, or whether the Examiner admits that neither Pierce, Dong, nor Perez teach the claimed filter media and thus Head is necessary to formulate an obviousness rejection.

Regardless, Head does not remedy the deficiencies of Pierce, Dong, and Perez. The Examiner relies on Head to disclose a fiber density of about 0.15 to 0.25 g/cc, arguing that it would have been obvious to modify Pierce in view of Head to produce a filter media having the claimed apparent density. The Examiner has overlooked the language of claim 8, which recites that the filter media have an *apparent* density of at least about 0.1μ to 4.5μ. The apparent density of a filter media is not the same as the fiber density of the fibers used to form the filter media. The apparent density is determined based on the thickness and the basis weight of the resulting filter media, whereas the fiber density is more like the specific gravity of the individual fibers used to form the filter media. Accordingly, Head does not remedy the deficiencies of Pierce, Dong, and Perez.

Moreover, as discussed above with respect to modifying the surface area of a filter media, the

apparent density cannot merely be “set” to a specific value as desired. It has to be obtained. A person having ordinary skill in the art cannot merely rely on Head, or any other reference, to teach a certain apparent density, and then merely decide to produce a filter media having that density. To the contrary, they would have to modify the process and/or materials based on the teachings of the prior art to form a filter media having the desired apparent density. The Examiner has failed to explain how Pierce would be modified to arrive at the claimed apparent density, and has failed to provide any motivation for doing so. Moreover, in order to modify Pierce to produce a filter media having the claimed apparent density, one would have to ignore the teachings of Pierce and make the filter taught by the prior art.

Accordingly, claim 8, as well as claims 9-12 which depend therefrom, distinguish over Pierce, Dong, Perez, and Head.

(3) Pierce, Pall, and Perez

Claims 8-12 are also rejected pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Pall and further in view of Perez.

First, claim 8 distinguishes over Pierce and Pall for the same reasons previously discussed with respect to claim 1. No person having ordinary skill in the art would be motivated to modify Pierce in view of Pall, and Perez does not remedy the deficiencies of Pierce and Pall.

Second, it again appears that the Examiner is relying on Perez to modify the surface area of Pierce to produce a filter media as disclosed in the present application, and thus to conclude that the filter media will inherently have the claimed apparent density. This conclusion is flawed, however, because a filter media having the same surface area as disclosed in applicant’s specification will not necessarily have the same apparent density.

Claim 8, as well as claims 9-12 which depend therefrom, therefore distinguish over Pierce, Pall, and Perez and represent allowable subject matter.

(4) Pierce, Pall, Perez, and Head

The Examiner also rejects independent claim 8, as well as claims 9-12 which depend

therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over Pierce, Pall, and Perez, and further in view of Head.

At the outset, the Examiner's reasons for this rejection are unclear. As noted above, claim 13 is rejected as being obvious over Pierce, Pall, and Perez. Now the Examiner further relies on Head to render claim 13 obvious. It is thus unclear whether the Examiner believes that Pierce, Pall, and Perez teach the filter media, or whether the Examiner admits that neither Pierce, Pall, nor Perez teach the claimed filter media and thus Head is necessary to formulate an obviousness rejection.

Regardless, Head does not remedy the deficiencies of Pierce, Pall, and Perez. As previously discussed, Head does not disclose the claimed apparent density, but rather merely discloses the fiber density of a fiber used in Head's filter. Moreover, a person having ordinary skill in the art cannot merely rely on Head, or some other prior art, to teach a certain density, and then merely decide to produce a filter media having that density. To the contrary, they would have to modify the process and/or materials based on the teachings of the prior art to form a filter media having the desired density. The Examiner has failed to explain how Pierce would be modified to arrive at the claimed apparent density, and has failed to provide any motivation for doing so. Moreover, in order to modify Pierce to produce a filter media having the claimed apparent density, one would have to ignore the teachings of Pierce and make the filter taught by the prior art.

Accordingly, claim 8, as well as claims 9-12 which depend therefrom, distinguish over Pierce, Pall, Perez, and Head.

III. Independent Claim 13

Independent claim 13 recites a filter media having a support layer, and a filtration layer including glass wool fibers having a diameter in the range of about 0.1μ to 4.5μ . Claim 13 further requires that the filter media have a gamma value of at least about 14.

(1) Pierce and Dong

The Examiner rejects independent claim 13, as well as claims 14 and 19-20 which depend therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong.

Independent claim 13 distinguishes over Pierce and Dong for the same reasons discussed above with respect to claim 1. Neither Pierce nor Dong teach or even suggest forming a filter media from a fiber slurry having an acidic pH that is adjusted to an alkaline pH, and thus Pierce and Dong do not inherently teach a filter media having the claimed gamma value. Dong also cannot be relied on as a reference because it represents non-analogous art.

Accordingly, independent claim 13, as well as claims 14 and 19-20 which depend therefrom, distinguish over Pierce and Dong and represent allowable subject matter.

(a) Dependent Claims 16 and 17

Claims 16 and 17 are rejected as being obvious over Pierce and Dong, and further in view of U.S. Patent No. 4,102,785 to Head et al. Claims 16 and 17 are allowable at least because they depend from claim 13 which, as discussed above, distinguishes over Pierce and Dong. Head does not remedy the deficiencies of Pierce and Dong, as Head fails to disclose the claimed apparent density.

(b) Dependent Claim 18

Claim 18 is rejected as being obvious over Pierce and Dong, and further in view of U.S. Patent No. 6,749,753 of Yamaguchi et al. Claim 18 is allowable at least because it depends from claim 13 which, as discussed above, distinguishes over Pierce and Dong. Yamaguchi does not remedy the deficiencies of Pierce and Dong as Yamaguchi is merely relied on to teach the claimed fiber diameter.

(2) Pierce, Dong, and Perez

The Examiner also rejects independent claim 13, as well as claims 14-17 and 19-20 which depend therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over Pierce in view of Dong, and further in view of Perez.

At the outset, the Examiner's reasons for this rejection are unclear. As noted above, claim 13 is rejected as being obvious over Pierce and Dong. Now the Examiner further relies on Perez to render claim 13 obvious. It is thus unclear whether the Examiner believes that Pierce and Dong teach the filter media, or whether the Examiner admits that neither Pierce nor Dong teach the claimed

filter media and thus Perez is necessary to formulate an obviousness rejection.

The Examiner's reliance on Perez to teach a particular surface area is also unclear, as claim 13 does not recite a surface area of the filter media.

Regardless, claim 13, as well as claims 14-17 and 19-20 which depend therefrom, distinguish over Pierce, Dong, and Perez for the same reasons previously discussed with respect to independent claim 1.

(a) Dependent Claims 16 and 17

Claims 16 and 17 are rejected as being obvious over Pierce, Dong, and Perez, and further in view of U.S. Patent No. 4,102,785 to Head et al. Claims 16 and 17 are allowable at least because they depend from claim 13 which, as discussed above, distinguishes over Pierce, Dong, and Perez. Head does not remedy the deficiencies of Pierce, Dong, and Perez, as Head fails to disclose the claimed apparent density.

(b) Dependent Claim 18

Claim 18 is rejected as being obvious over Pierce, Dong, and Perez, and further in view of U.S. Patent No. 6,749,753 of Yamaguchi et al. Claim 18 is allowable at least because it depends from claim 13 which, as discussed above, distinguishes over Pierce, Dong, and Perez. Yamaguchi does not remedy the deficiencies of Pierce, Dong, and Perez as Yamaguchi is merely relied on to teach the claimed fiber diameter.

(3) Pierce and Pall

The Examiner also rejects claims 13-14 and 19-20 pursuant to 35 U.S.C. §103(a) as being obvious over WO 01/43850 to Pierce in view of Pall. Like Dong, like Examiner relies on Pall to disclose varying the pH of the nonwoven glass layer during the wet laid process to a pH in the range of about 7 to about 10, thereby obtaining a filter media that inherently has the claimed gamma value. Applicants disagree. For the same reasons previously discussed with respect to independent claim 1, no person having ordinary skill would be motivated to modify Pierce in view of Pall. Claim 13, as well as claims 14 and 19-20 which depend therefrom, therefore distinguish over Pierce and Pall and

represent allowable subject matter.

(a) Dependent Claims 16 and 17

Claims 16 and 17 are rejected as being obvious over Pierce and Pall, and further in view of Head. Claims 16 and 17 are allowable at least because they depend from claim 13 which, as discussed above, distinguishes over Pierce and Pall. Head does not remedy the deficiencies of Pierce and Pall, as Head fails to disclose the claimed apparent density.

(b) Dependent Claim 18

Claim 18 is rejected as being obvious over Pierce and Pall, and further in view of Yamaguchi. Claim 18 is allowable at least because it depends from claim 13 which, as discussed above, distinguishes over Pierce and Pall. Yamaguchi likewise does not remedy the deficiencies of Pierce and Pall as Yamaguchi is merely relied on to teach the claimed fiber diameter.

(4) Pierce, Pall, and Perez

The Examiner also rejects independent claim 13, as well as claims 14-17 and 19-20 which depend therefrom, pursuant to 35 U.S.C. §103(a) as being obvious over Pierce and Pall, and further in view of Perez.

As discussed above with respect to the Examiner's rejection of claim 13 over Pierce, Dong, and Perez, the Examiner's reasons for this rejection are unclear. The Examiner rejects claim 13 as being obvious over Pierce and Pall alone. Now the Examiner further relies on Perez to render claim 13 obvious. It is thus unclear whether the Examiner believes that Pierce and Pall teach the filter media, or whether the Examiner admits that neither Pierce nor Pall teach the claimed filter media and thus Perez is necessary to formulate an obviousness rejection.

The Examiner's reliance on Perez to teach a particular surface area is also unclear, as claim 13 does not recite a surface area of the filter media.

Regardless, claim 13, as well as claims 14-17 and 19-20 which depend therefrom, distinguish over Pierce, Pall, and Perez for the same reasons previously discussed with respect to claim 1.

(a) Dependent Claims 16 and 17

Claims 16 and 17 are rejected as being obvious over Pierce, Dong, and Perez, and further in view of Head. Claims 16 and 17 are allowable at least because they depend from claim 13 which, as discussed above, distinguishes over Pierce, Pall, and Perez. Head does not remedy the deficiencies of Pierce, Pall, and Perez, as Head fails to disclose the claimed apparent density.

(b) Dependent Claim 18

Claim 18 is rejected as being obvious over Pierce, Dong, and Perez, and further in view of Yamaguchi. Claim 18 is allowable at least because it depends from claim 13 which, as discussed above, distinguishes over Pierce, Pall, and Perez. Yamaguchi likewise does not remedy the deficiencies of Pierce, Pall, and Perez, as Yamaguchi is merely relied on to teach the claimed fiber diameter.

Conclusion

In conclusion, Applicant submits that all claims are now in condition for allowance, and allowance thereof is respectfully requested. The Examiner is encouraged to telephone the undersigned attorney for Applicant if such communication is deemed to expedite prosecution of this application.

Respectfully submitted,

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Lisa Adams, Reg. No. 44,238
Attorney for Applicant(s)

Nutter McClennen & Fish LLP
World Trade Center West
155 Seaport Boulevard
Boston, MA 02210
Tel: (617)439-2550
Fax: (617)310-9550